

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Calculus Review for Q2 Test 1

This review sheet should NOT serve as your only review. Be sure to review your notes and homework as well.

1. An object moves along a line so that its position at time  $t$  is given by  $s(t) = t^3 - 9t^2 + 24t + 3$  where  $t \geq 0$ .

- What is the object's position at time  $t = 3$ ?
- What is the object's velocity at time  $t = 3$ ?
- What is the object's acceleration at time  $t = 3$ ?
- Is the object speeding up or slowing down at  $t = 3$ ? Justify your response.
- When is the object at rest?
- When is the object moving right?
- How far does the object travel in the first 4 seconds?

2. An object moves along a line so that its position at time  $t$  is given by  $s(t) = t^3 - 4t^2 + 4t + 3$  where  $t \geq 0$ .

- What is the object's position at time  $t = 3$ ?
- What is the object's velocity at time  $t = 3$ ?
- What is the object's acceleration at time  $t = 3$ ?
- Is the object speeding up or slowing down at  $t = 3$ ? Justify your response.
- When is the object at rest?
- When is the object moving left?
- How far does the object travel in the first 4 seconds?

3. Differentiate each of the following with respect to  $x$ .

- $y = \sin(x-3)^2$
- $y = \sec(2x)$
- $y = \tan \sqrt{3x-2}$
- $y = x \cos x$
- $y = \cot^2 x$

4. Write an equation for the line tangent to  $f(x) = 2x^3 + \frac{5}{x^2} - 3$  when  $x = 1$ . (Round all values to the nearest thousandth.)
5. Write an equation for the line tangent to  $f(x) = 3\sqrt{x} - 5e^{x^2} + 7\ln(2x+1)$  when  $x = 2$ . (Round all values to the nearest thousandth.)
6. Use Implicit Differentiation to find the derivative of each of the following:
- a.  $x^2 + xy + y^2 = 4$
  - b.  $y^2 + 9x = x^2$
  - c.  $3x^2 = 2y^2 + 1$
  - d.  $x^2 - y^2 = 2xy$
  - e.  $x^3 + xy + y^3 = 4$
  - f.  $2 = 4x + 3x^2y^2$
  - g.  $\frac{1}{y} + \frac{1}{x} = 2$